

WHAT IS CLAIMED IS:

1                   1.       A balloon catheter comprising:  
2                               a catheter body having a proximal end, a distal end, and a balloon  
3 inflation lumen extending to the distal end;  
4                               a balloon having a distal end, a proximal end attached to the distal end  
5 of the catheter body, and an expandable region between the distal and proximal ends; and  
6                               a guidewire tube disposed within the balloon and having a proximal  
7 end, a distal end, and a guidewire lumen therebetween, wherein the proximal end of the  
8 guidewire tube is spaced distally of the distal end of the catheter body.

1                   2.       A balloon catheter as in claim 1, wherein the balloon inflation lumen  
2 extends from the distal end to the proximal end of the catheter body.

1                   3.       A balloon catheter as in claim 1, wherein the balloon has a distal neck  
2 portion, a proximal neck portion, and wherein the expandable region is between said neck  
3 portions.

1                   4.       A balloon catheter as in claim 3, wherein the proximal neck portion of  
2 the balloon is joined over the distal end of the catheter body.

1                   5.       A balloon catheter as in claim 3, wherein the proximal neck portion of  
2 the balloon is joined under the distal end of the catheter body.

1                   6.       A balloon catheter as in claim 3, wherein the proximal neck portion of  
2 the balloon is butt joined to the distal end of the catheter.

1                   7.       A balloon catheter as in claim 1, wherein the distal end of the  
2 guidewire tube extends distally beyond the distal end of the balloon.

1                   8.       A balloon catheter as in claim 7, wherein the distal end of the  
2 guidewire tube is spaced-distally from the distal end of the expandable region of the balloon  
3 by a distance greater than the distance between the proximal end of the guidewire tube and  
4 the proximal end of the expandable region of the balloon.

1                   9.       A balloon catheter as in any of claims 1-7 or 8, wherein the proximal  
2 end of the guidewire tube opens through the expandable region of the balloon.

1                   10.     A balloon catheter as in any of claims 1-7 or 8, wherein the proximal  
2 end of the guidewire tube opens through the proximal neck portion of the balloon at a  
3 location distal of the proximal end of the catheter body.

1                   11.     A balloon catheter as in claim 10, wherein the proximal end of the  
2 guidewire tube is positioned within the proximal portion of the balloon so that inflation  
3 medium from the inflation lumen of the catheter body can pass the guidewire tube and enter  
4 the expandable region of the balloon.

1                   12.     A balloon catheter as in any of claims 1-7 or 8, wherein no portion of  
2 the catheter body overlaps axially with a portion of the guidewire tube.

1                   13.     A balloon catheter as in claim 12, wherein the gap between the catheter  
2 body and the guidewire tube is at least 1 mm.

1                   14.     An improved catheter of the type comprising a catheter body and an  
2 interventional or diagnostic element at a distal end of the catheter body, wherein the  
3 improvement comprises a guidewire tube passing through the interventional element wherein  
4 the guidewire tube has a proximal end which is spaced distally of a distal end of the catheter  
5 body, by a distance less than that of a distal end of the guidewire tube from the interventional  
6 element..

1                   15.     An improved catheter as in claim 12, wherein the interventional or  
2 diagnostic element is selected from the group consisting of balloons, mechanically  
3 expandable elements, ultrasonic transducers, radiation sources, heating sources, cryogenic  
4 sources, drug release mechanisms, atherectomy elements, thermal detectors, and optical  
5 coherence tomography (OCT) elements.